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Survey on Graduate of Manufacturing Engineering Program

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Abstract

An exit survey is a powerful tools that allow the University to obtain information about students' satisfaction with a range of academic and supervision experiences during their study at UKM and to inquire about their plans for the future. This study used a set of questionnaires which comprise of five main sections; Section A-general background, Section B-PO achievement, Section C- educational achievement throughout 4 years at UKM, Section D-career preparation and Section E-Relationship between lecturer-student. This study was conducted on two consecutive sessions (semester 2010/2011 and 2011/2012). Based on the findings, PO achievement for both sessions' shows a satisfactory result where all students achieved more than 3.5 out of 5 scales except for PO3 and PO6 in session 2011/2012. Next, curriculum and teaching and learning process during four years study in UKM showed that all students achieved more than 3.5 scales. The same trend also occurs for career aspect where in 2011 the lowest is 3.68 and in a year later is 3.54. Finally, relationship between student and staff has revealed the lowest score of 3.08 for mentor-mentee system in 2012

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Keywords: Exit survey; Manufacturing programme; curriculum; PO; Educational achievement.

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1. Introduction

Nowadays, there is a great diversification in higher education) system. The institute of higher learning (IHL) is the responsible party to equip the younger generations with a new skills and knowledge [1]. Institutional background becomes the main judging criteria for the industry to select potential employee when it comes to fresh graduate. Prestigious institute normally provide good educational program in preparing a qualified graduate. In addition, the IHL's administration lecturers also playing their role to improve the quality and consequently produce better product. In general, there are support teaching systems for instance effective counselling and resourceful library provided along with information access skill courses [2]. It is due to the fact the student is a customer and also a stakeholder of the IHL.

Realizing the fact that a graduate is a good reflection of his or her alma meter, research on the ex-student may potentially give promising outcomes. It is call as the Exit Survey. Shahruddin Ahmad and Koh Aik Khoon [3] in their article explained how the educational system equipped them to survive and success later on. The quality of each graduate itself is the proof of successes level of university's program, as well as becoming benchmark for continuous improvement in the future. Therefore, in order to fulfill the Engineering of Accreditation Council (EAC) requirement, every alumni is required to give some information about their current jobs. In fact, this survey was actually conducted annually even there are some difficulties in locating their work place as well as receiving feedbacks from the respondents [4]. In fact, one of the universities in Australia was conducted the exit survey to find out the reasons why students have chosen not to further studying at their University and to use the information to improve their academic and administrative support services for students [5]. Another study conducted by Howard University [6] also used the exit survey method to gain information about students' satisfaction on academic and co-academic programmes and to inquire about their plans for the future. In addition, the exit survey was used as a tool to improve the programme at the University.

All in all, the objective of this study is to verify readiness to work as an engineer and to measure the achievement level of programme outcome after four years study in Faculty of Engineering and Built Environment under Manufacturing Engineering programme. Previous researcher adopted similar method to measure the achievement of Programme Outcome but focusing on Chemical Engineering student [7]. One of the most significant issues raised here is whether the content of the programme and value added skills been taught for four years of study contribute sufficiently to the success of being a good engineer. A questionnaire embraced all the aspect of study was designed and the content is discussed in detail in the next part.

2. Methodology

The exit survey method was used to gain general information regarding graduate's achievement and perception based on programme outcome (PO), their career preparation and relationship between student-lecturer. This study was conducted among all fourth year students of Manufacturing Engineering (ME) programme for two consecutive sessions which are 2010/2011 and 2011/2012. This quantitative survey was carried out on a sample size of 31 respondents on 2011 and 26 respondents on 2012.

In conducting a survey, a set of questionnaires were developed based on past experiences and practices in the department and faculty [7]. A set of survey questionnaire was carefully designed to ensure the objectives of this study will be achieved. This questionnaire consists of five main parts; Section A- general background, Section B-PO achievement, Section C- educational achievement throughout 4 years at UKM, Section D-career preparation and Section E-Relationship between lecturer-student. Basically, Section A required the respondent to answer five main simple questions; expected graduation, field of study, planning after graduate; preferred industry to work;

and job offer if related. Meanwhile, for Section B till Section E, the Likert Scale rating of 1 (poor) to 5 (excellent) was used.

Section B covered on PO achievement throughout four years at UKM. In 2011, twelve POs were listed in due to its implementation on that year, which is tabulated in Table 1. While in 2012, a new nine POs were listed due to feedback from external assessors. Table 2 shows the new POs in 2012.

Table 1 Programme Outcome (POs) of Manufacturing Engineering in 2011

No	POs
1	Ability to acquire and apply knowledge of basic science and engineering fundamentals
2	Ability to communicate effectively, not only with engineers but also with the community at large
3	Having in-depth technical competence in the manufacturing engineering discipline
4	Ability to undertake problem identification, formulation and solution using the modern engineering tools
5	Ability to utilise a systems approach to design and evaluate operational performance
6	Ability to function effectively as an individual and in a group with the capacity to be a leader or manager as well as an effective team member,
7	Ability to have an understanding of the social, cultural, global and environmental responsibilities and ethics of a professional engineer and the need for sustainable development
8	Ability to recognise the need to undertake lifelong learning, possessing/acquiring the capacity to do so
9	Ability to design and conduct experiments, as well as to analyse and interpret data
10	Ability to function on multi-disciplinary teams
11	Having the knowledge of contemporary issues in manufacturing engineering
12	Having the knowledge of project management concepts, administration, business and entrepreneurship

Table 2 Programme Outcome (POs) of Manufacturing Engineering in 2012

No	POs
1	Ability to apply knowledge of mathematics, science and engineering
2	Ability to identify, formulates, solve and improve engineering problems using techniques, skills, and modern engineering tools necessary for engineering practice
3	Ability to design a component, system or process to meet desired needs
4	Understanding of professional and ethical responsibility from knowledge of environmental and contemporary issues
5	Ability to understand and apply in-depth knowledge of one or more area of specializations within manufacturing engineering
6	Ability to design and conduct experiments, as well as to analyse and interpret data
7	Ability to communicate and to function effectively in a team
8	Recognition of the need for, and an ability to engage in life-long learning
9	Knowledgeable in project management, administration, business acumen and entrepreneurship

For Section C which is curriculum and teaching and learning process this section comprised on eleven aspects (based on question on questionnaire) as shown in Table 3. Section D contained on six aspects on career as presented in Table 4. Meanwhile Section E encompassed on five aspects in Table 5 that described on relationship between lecturer and student.

Table 3 Educational achievement aspect

Aspect	Description
1	Contents of programme technical
2	Design experience and conduct lab experiment including data analysis,
3	Ability to apply engineering principle on ME problems and system design,
4	Teamwork involvement
5	Training on problem solving,
6	Understanding on ethical and professionalism issues and how to use them,
7	Effective communication, writing skills
8	Quality of another courses not related to engineering and how this courses assist you to be a global engineer
9	Ability to use general software (eg: word, excel) and professional software (eg: AutoCAD etc.)
10	Quality of overall experience learn at the department,
11	Confidence to work as an manufacturing engineer

Table 4 Job preparation and provision aspect

Aspect	Description
1	Preparation of technical aspects in engineering career
2	Ability to manage technical projects
3	Preparation to perform a research and engineering development
4	Preparation to further study to higher level
5	Job opportunity through UKM website
6	Experience through industrial training.

Table 5 Relationship between student and lecturer aspect

Aspect	Description
1	Quality and mentor-mentee advantage
2	Availability of the lecturer in responding to questions in the class and help students to understand the course content
3	Opportunity to meet lecturer outside the class schedule for further advise
4	Overall quality of relationship between lecturer-students
5	Overall quality of relationship between students and lecturer or staff or office staff.

Overall, the analysis of the survey results is discussed considering the three aspects of evaluation process, namely; achievement of learning gains that relates to PO; assessment of curriculum and teaching and learning process; career aspects; and perception on relationship between student and lecturer. With respects to the type of information obtained and objective of the study, data analysis was limited to basic descriptive analysis based on the numbers, percentages and charts.

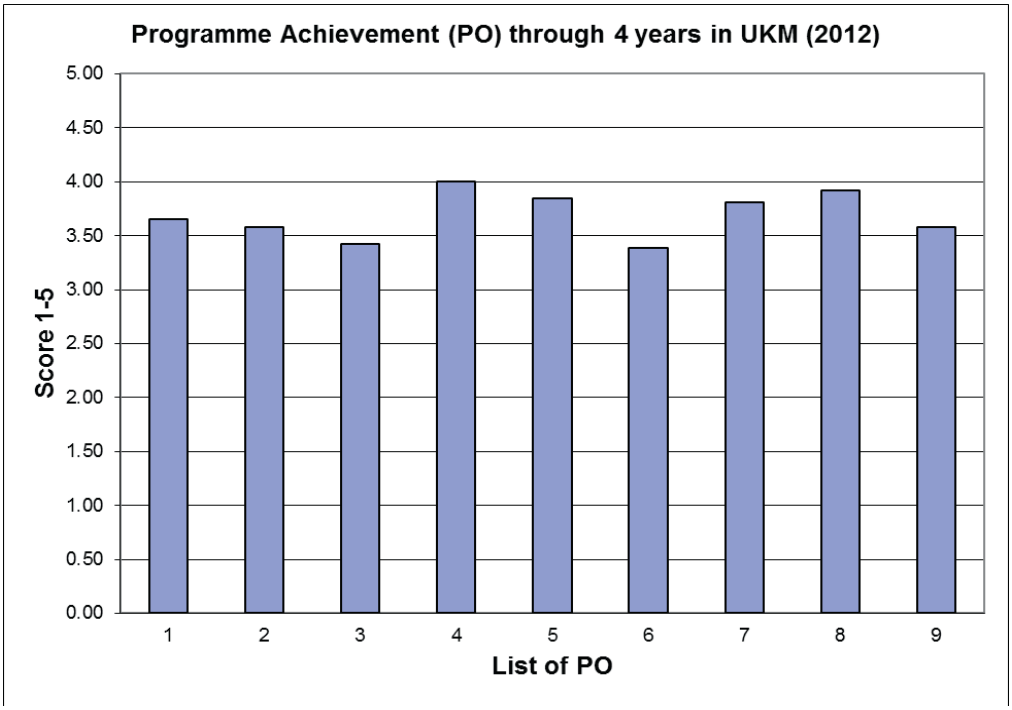
3. Results and Discussion

3.1 PO Achievement through Four Years at UKM

For Continuous Quality Improvement (CQI) purpose, each programme in the department will be assessed within one to two years to ensure the programme keep relevant with the current need. Based on the feedback from the stakeholder, one of the improvement have been made is to look into PO of the programme and reconstruct again according to the need. As the result PO for the programme was reduced from twelve to nine and yet they still covers up the three Programme Educational Objective (PEO) setting by the university starting by the year 2012. Based on these studies, there are two set of data from 2011 and 2012 batch represent PO12 and PO9 respectively. The data, however totally depend on the student's perspective on their achievement.

In 2011, most of the PO are scoring more than 3.5 with the highest is 4.16 for PO7 (ability to have an understanding of the social, cultural, global and environmental responsibilities and ethics of a professional

engineer and the need for sustainable development) and the lowest is 3.55 for PO12 (having the knowledge of project management concepts, administration, business and entrepreneurship) as shown in Figure 1(a).



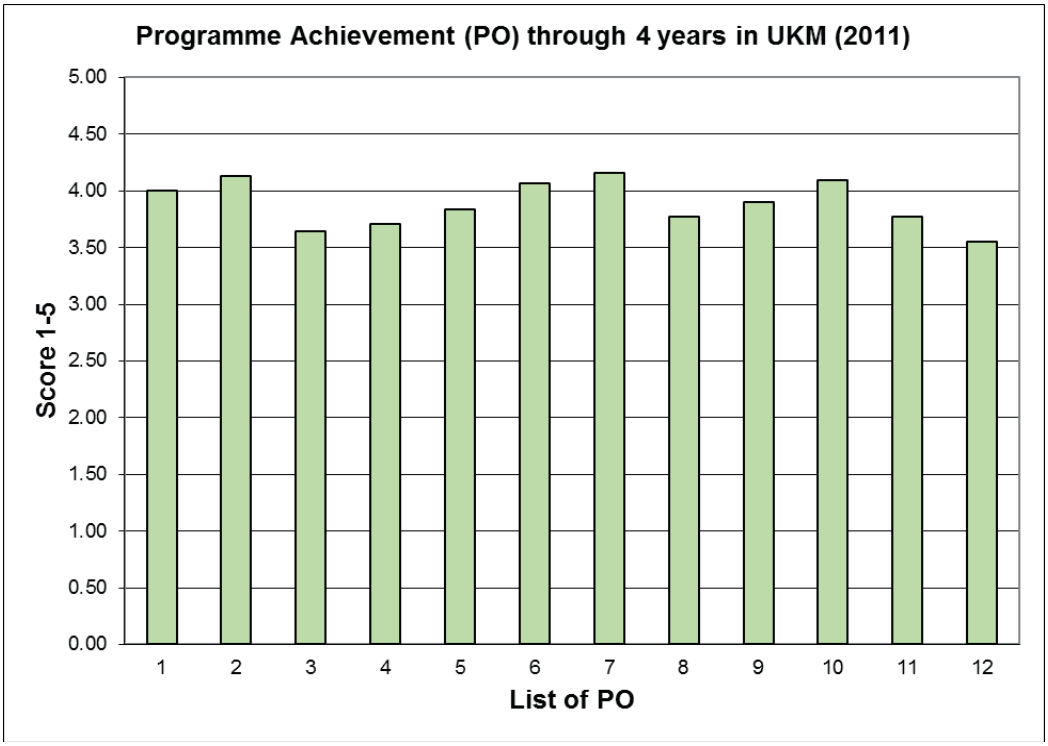


Fig. 1 (a) PO achievement in 2012 and (b) PO achievement in 2011

With regards to Figure 1(b), in 2012, most of the PO's scored more than 3.5 in average except for PO3 (ability to design a component, system or process to meet desired needs) and PO6 (ability to design and conduct experiments, as well as to analyse and interpret data).

Based on the findings, the PO criteria that achieved below 3.5 in 2011 and 2012 is totally different. For example, in 2011, PO12 which indicate about the knowledge of project management concepts, administration, business and entrepreneurship related to PO 9 in 2012. The score is more than 3.5. In addition, another example is on PO6 in 2012. This PO highlights about design, conduct experiment and analyse the data, which is related to PO9 in 2011.

3.2 Student Perspective of Performance

As mentioned in Table 3, there are 11 aspects that have been covered for measuring the education achievement during four years study in UKM. Based on Figure 2, most of the results show that there is a decreasing pattern from 2011 to 2012. Interestingly, however, there is a increasing score on understanding on ethical and professionalism issues (aspect no.6) and how to use them and confidence to work as a manufacturing engineer (aspect no. 11).

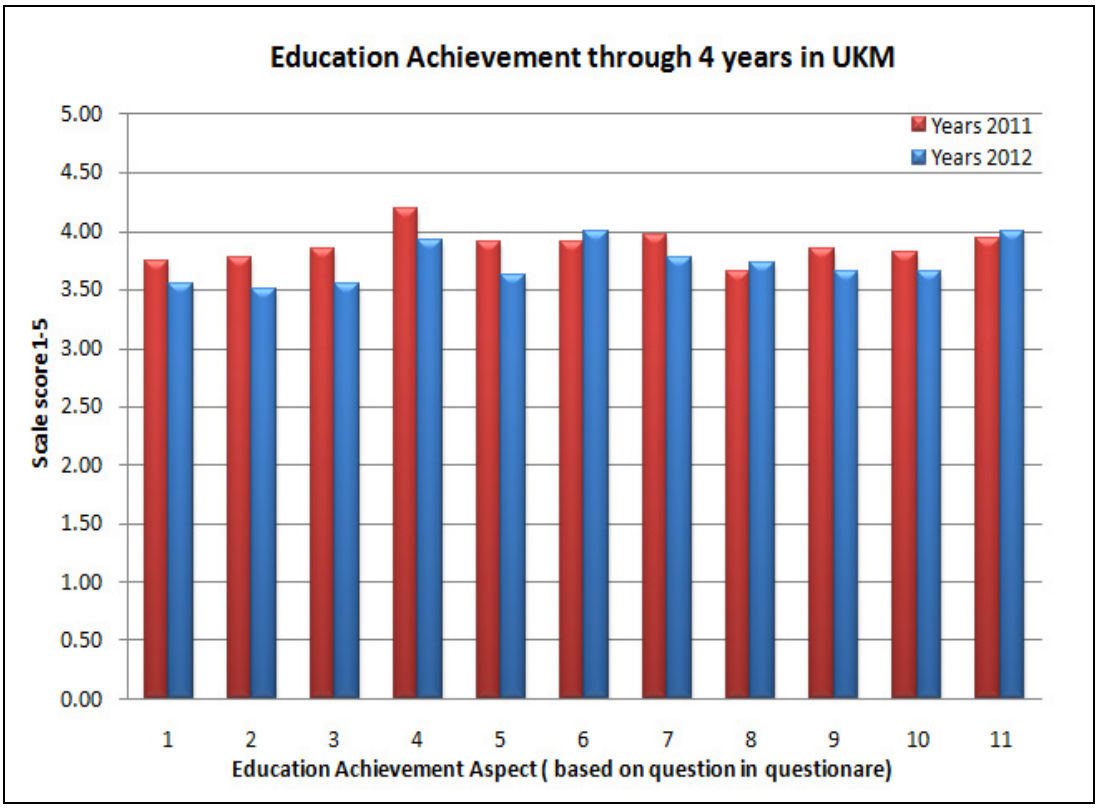


Fig. 2 Education Achievement through 4 years in UKM for batch 2011 and 2012

Both of the batches agree, they all have good teamwork achievements which indicate the highest mark on 2011 and just below 4.00 in 2012. They also agreed they accomplish the less achievement in content of programme technical which represented the lowest score in 2011 and just above 3.5 in 2012.

3.3 Job preparation and provision aspect

On job preparation and provision, both group agreed they gain good experience through the industrial training and this indicated by the highest score on average as shown in Figure 3. They think industrial training that is compulsory for them in order to graduate is one of the best processes preparing themselves to work in the real world.

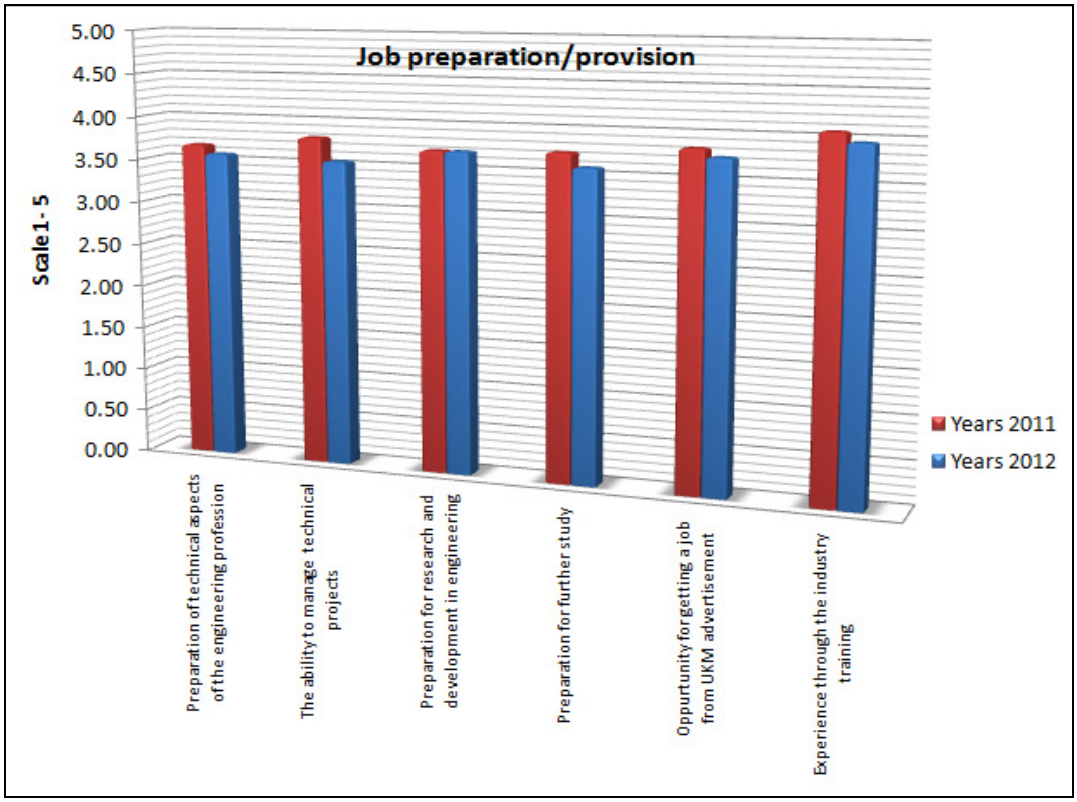


Fig. 3 Job preparation/provision

In 2011, the lowest score is on preparation of the technical aspects with 3.68 and in 2012, the lowest mark is on ability to manage technical project with 3.54. From the result, it can be noticed that both batch still have a lack of confidence when come to the technical part whether on preparing or managing the technical phase.

3.4 Relationship between student and staff

In 2012, the management of mentor-mentee system is in the transition process to change in a new system and result a small number of monitoring and discussion between student and academician. As the consequence, the quality of the mentor-mentee system illustrious the lowest marks 3.08 as shown in Figure 4. As one of that effect, relatively, on all the aspect relationship between staff and student, noted a decreasing in all aspect.

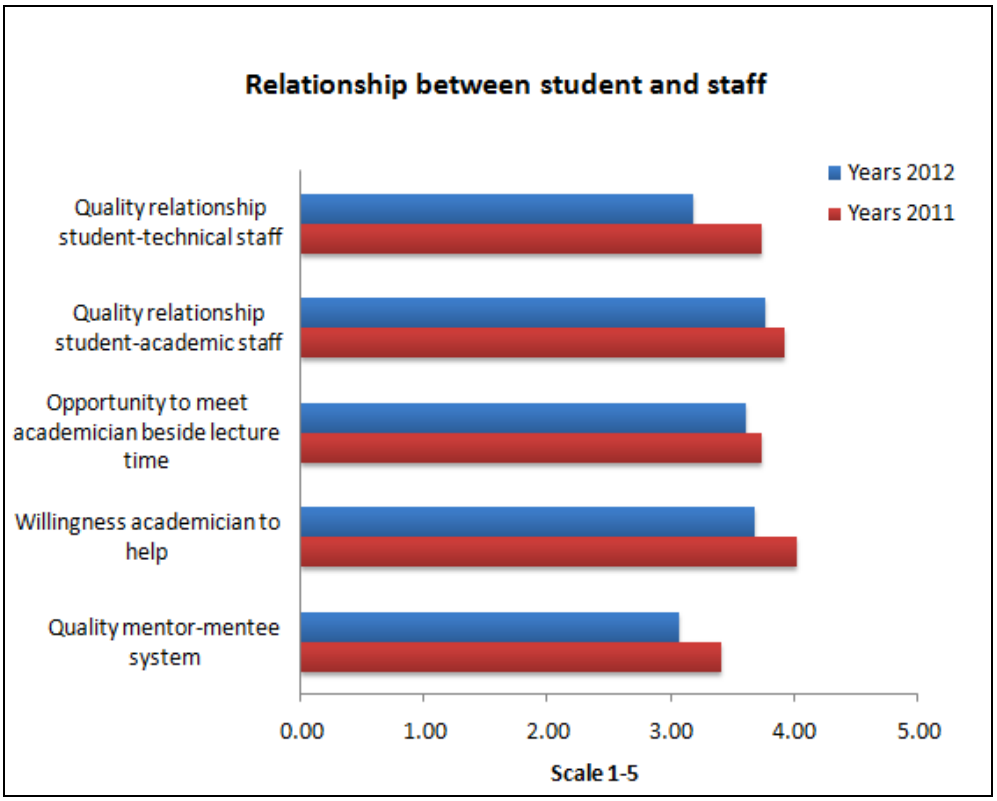


Fig. 4 Relationship between student and staff

Although the quality mentor-mentee system scores the lowest mark on both year with 3.00 and 3.3 respectively, quality relationship between student and academic staff and also willingness academician to help noted highest value. From that data, we can conclude the relations between students are still in good quality and there is some need to improve the mentor mentee system in order to develop more quality of the system and relation between students and staff.

4. Conclusion

The study has been successfully done upon two consecutive batches of students; 2010/2011 and 2011/2012 graduates. From the results, it can be concluded that there are rooms to make changes for the next batch of graduate as these two consequence years showed decreasing achievement in overall. However, the method of surveying also need some improvement as the survey is purely based on student's perception, which it may vary from one student to the other.

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